

Status of the DØ Muon System

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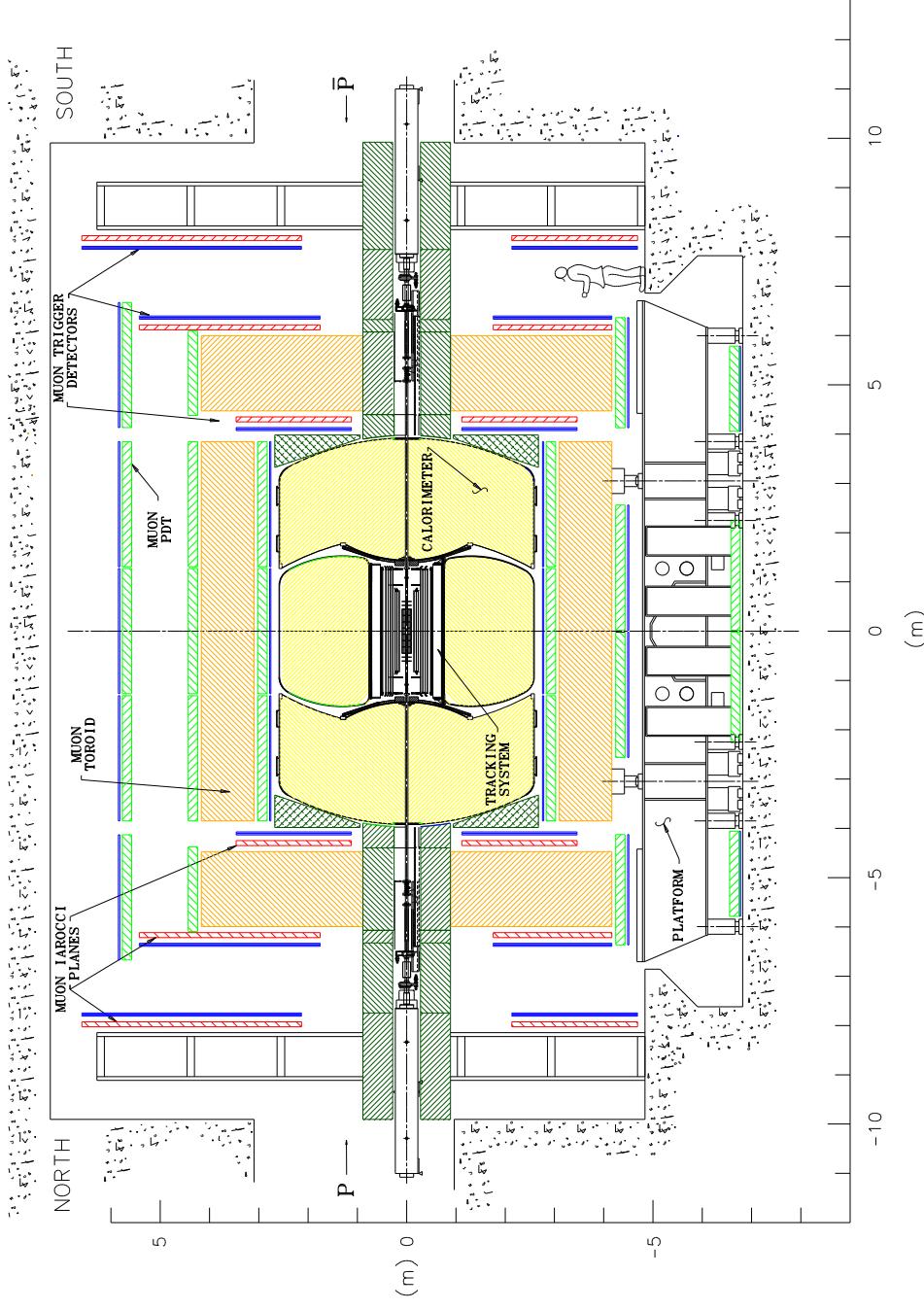
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Overview

1. Front End Systems:
 - Central Wire Chambers (PDT's),
 - Forward Wire Chambers (MDT's),
 - Central Scintillator Counters,
 - Forward Scintillator (Pixel) Counters.
2. Trigger:
 - Level 1,
 - Level 2,
 - Level 3 Muon Filter.
3. Readout System.
4. Conclusion.

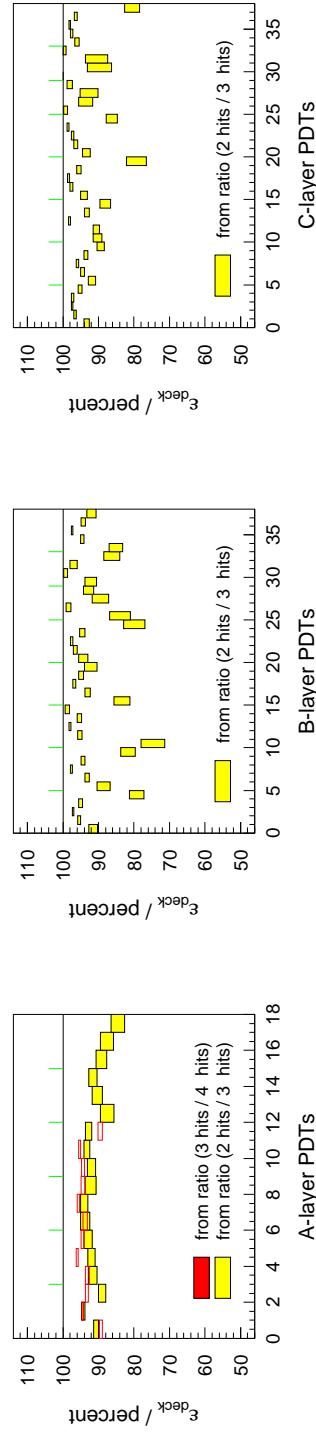
D \varnothing Muon Detectors



Central Wire Chambers (PDT's)

6624 drift cells in 94 three- and four-deck chambers arranged in 3 layers around the central part of the detector. One front end control board per chamber, 6 readout crates total. 14 cells masked off.

- Mostly stable running. Occasional ($< 2\%$ of events) synchronization problems in 2 front ends. Working on that.
- All channels have been calibrated and the appropriate t_0 values loaded to the front ends.
- Efficiency studies under way.



Forward Wire Chambers (MDT's)

6080 eight-cell tubes assembled in 3 layers on the north and south side divided into 8 octants. Total of 48640 channels, 24 front end crates and 2 readout crates.

- No major problems: gas and high voltage systems stable, virtually no data transmission errors during global runs.
- 293 (about 0.6%) dead channels.
- Work in progress on improving channel hit map measurement using cosmics.

Central Scintillator Counters

360 “cosmic cap” counters and 630 “ $A - \phi$ ” counters. 6 front end and 2 readout crates.

- No major problems.
- All B and C layer channels alive, 1 dead A layer channel.
- B and C layers have about 93% of all channels calibrated with adjusted threshold to compensate for gain variation. Gain monitoring and HV adjustment completed for these 93%.
- Recently obtained LED data for gain measurements and determination of photo-electron yield in the A layer. This will be combined with cosmic ray run data.

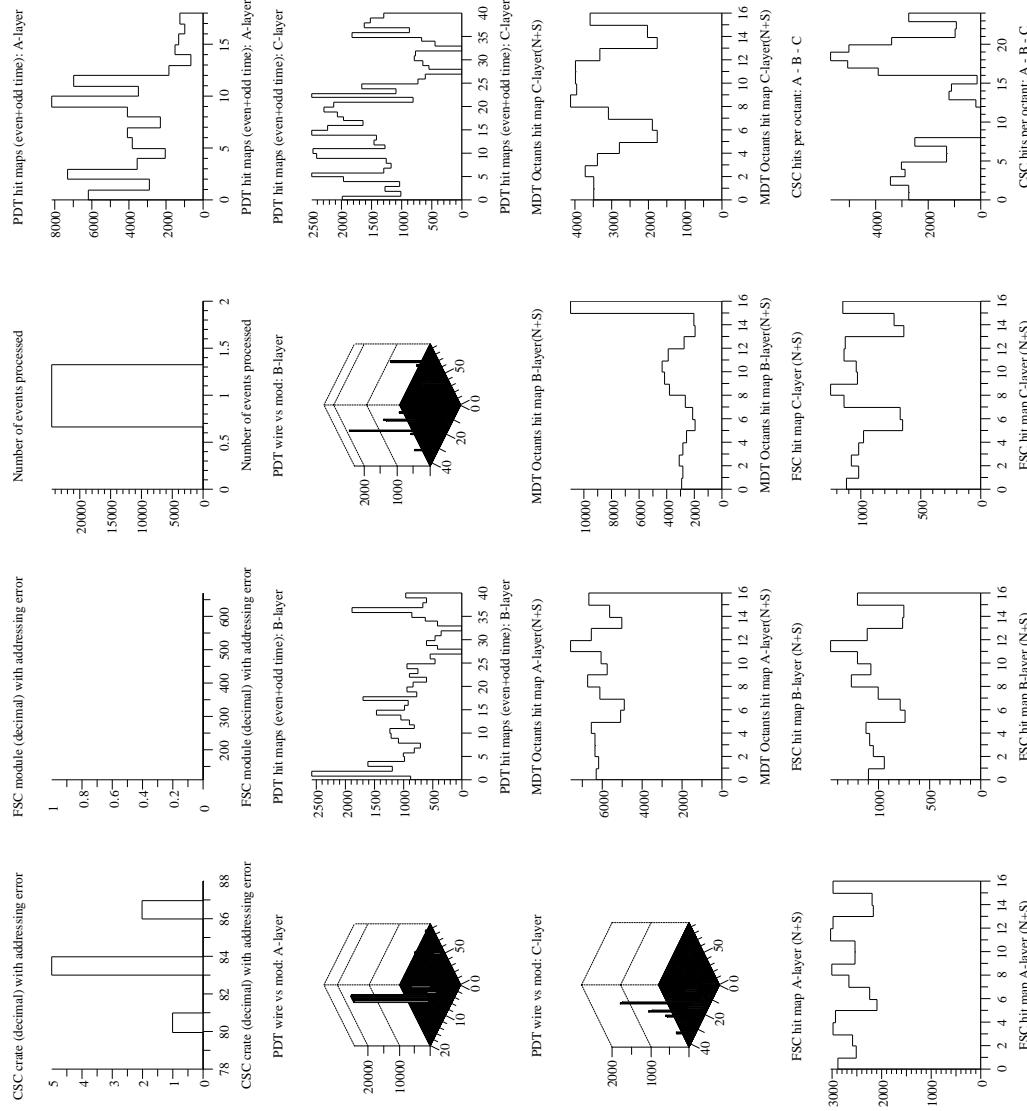
Forward (Pixel) Scintillator Counters

4214 scintillator counters arranged in 3 layers on the north and south side of the detector. 12 front end crates, 2 readout crates.

- No major problems.
- 3 dead channels (need to replace PMT's).
- Front end controllers need a minor hardware fix to improve synchronization stability.

Online Hit Maps

Items from PAWC/MUONLINE_EXAMINE



Level 1 Trigger

- Central and forward scintillator triggers operational.
- PDT triggers should be ready within a month.
- MDT triggers will take a little longer (some hardware problems, trigger cards for the south MDT's not available yet).
- L1 trigger simulator up and running, discrepancy between the hardware and simulator less than 1%.

Level 2 Trigger

- Hardware and firmware in place.
- Rejection turned off at the moment. Will start rejecting events as soon as efficiency is understood.

Level 3 Muon Filter

- Major technical issues with software have been resolved lately (data-driven unpacking, speed, memory leaks).
- Ready to start in the “mark and pass” mode. Actual filtering will be turned on as soon as the online efficiency and rejection are verified *vs.* the offline results and some global L3 integration issues are resolved.

Readout System: Overview and Current Issues

Sixteen VME crates powered by the m68k processors under VX-Works. Each crate contains a fanout card (MFC) that receives timing and trigger information from the Trigger Framework, readout cards, and a L3 output interface board (VBD or SBC). All crates run the same data acquisition program controlled via EPICS from a single GUI.

- Occasional (a few per hour total) readout crate “hang-ups” during high rate data taking and front end failures on the global trigger framework initialization signal (believed to be a problem on the readout side).
- Master processors over 10 years old, barely meet the CPU and memory demands for the target data taking rate of $\simeq 1 \text{ kHz}$ into L3.

Readout System: Work in Progress

- MFC upgrade. New boards will be available in about a week from now. Studies with the new prototype MFC's show that the readout problems occur a few times less frequently than with the old MFC.
- VBD's will be replaced by the single board computers running Linux as a part of the general $D\bar{\varnothing}$ DAQ upgrade within a month.
- Master processors will be replaced with Power PC's (part of the Run 2b upgrade). Tests in progress in one crate.

Conclusion

- $D\emptyset$ muon detector system is complete and operational.
- Work on the three levels of the muon trigger system is converging and is expected to be complete by summer.
- Remaining readout problems are being addressed, most of them are expected to be fixed by the MFC upgrade.